

National Aeronautics and
Space Administration



EXPLORE SOLAR SYSTEM & BEYOND

Astrophysics Community Town Hall

May 3, 2022

Paul Hertz

Director, Astrophysics Division
Science Mission Directorate

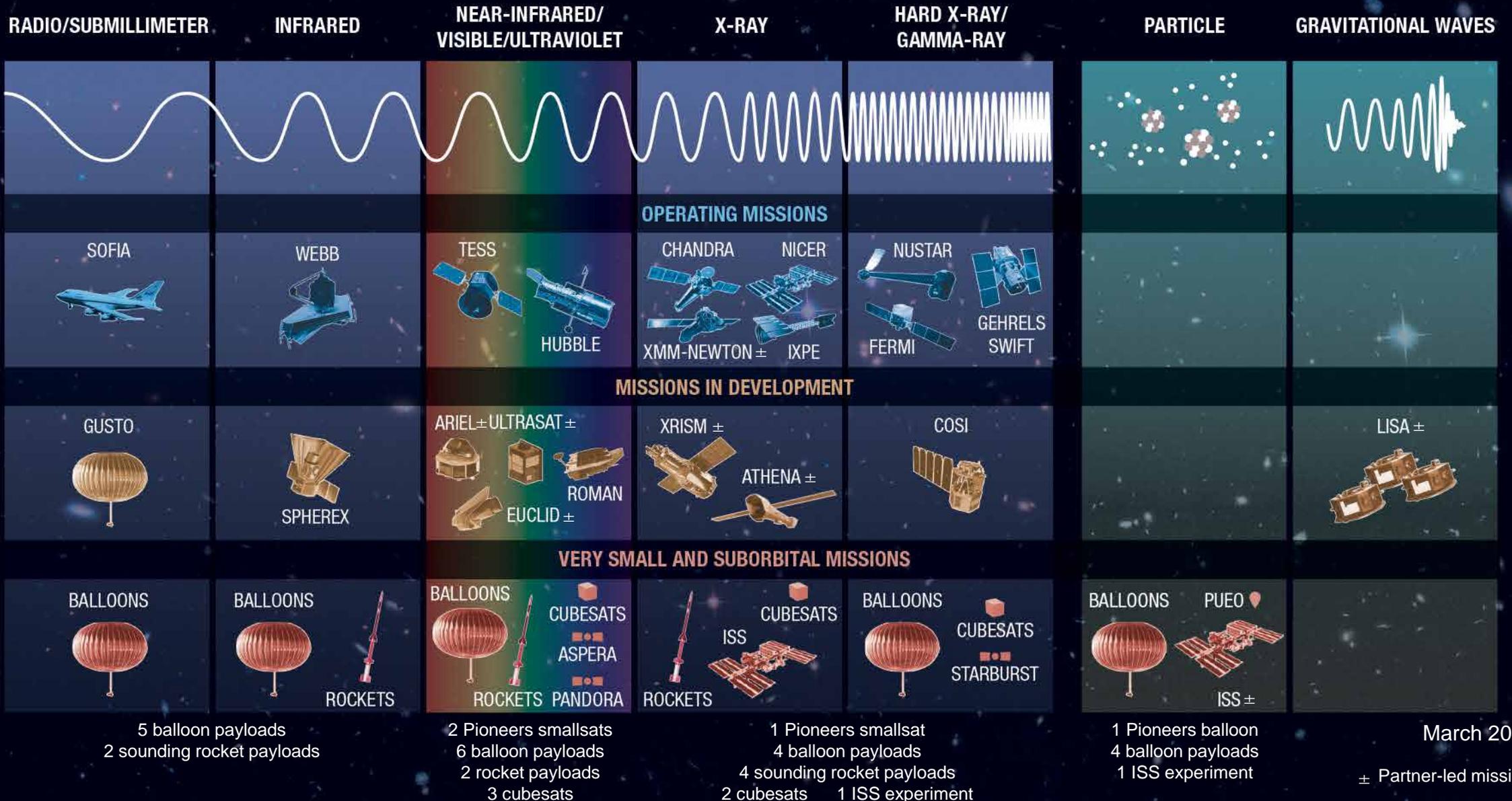
Eric Smith

Chief Scientist, Astrophysics Division
Science Mission Directorate

 [@NASAUniverse](https://twitter.com/NASAUniverse) [@NASAExoplanets](https://twitter.com/NASAExoplanets)

Charts available at <https://science.nasa.gov/astrophysics/documents>

ELECTROMAGNETIC SPECTRUM



March 2022

± Partner-led mission



Agenda

1. James Webb Space Telescope Commissioning Status
2. FY23 President's Budget Request
3. NASA's Preliminary Response to the 2020 Decadal Survey
4. Questions/Comments Portal:

<https://nasa.cnf.io/sessions/g663/#!/dashboard>

You can't escape Black Hole Week!

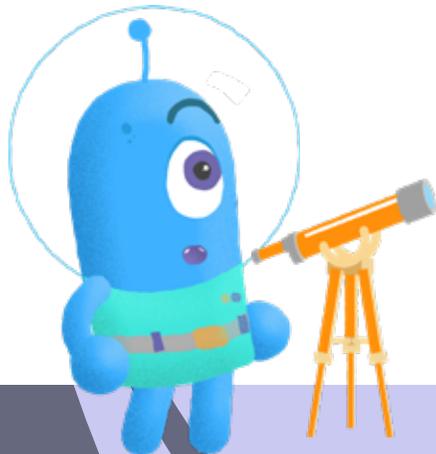


When: NOW! May 2-6

What: A celebration of black holes through social media, multimedia and news features led by the NASA Universe team

Where: Everywhere! The NASA Universe team is leading this event, but partners from all over are participating including LIGO, EHT, NSF, NOIRLab, and NRAO. The [@NASAUniverse](#) Twitter and Facebook accounts are the main hub, but we expect participation on Instagram from several NASA accounts.

How: Watch for the hashtag [#BlackHoleWeek](#) and share your own content using it.

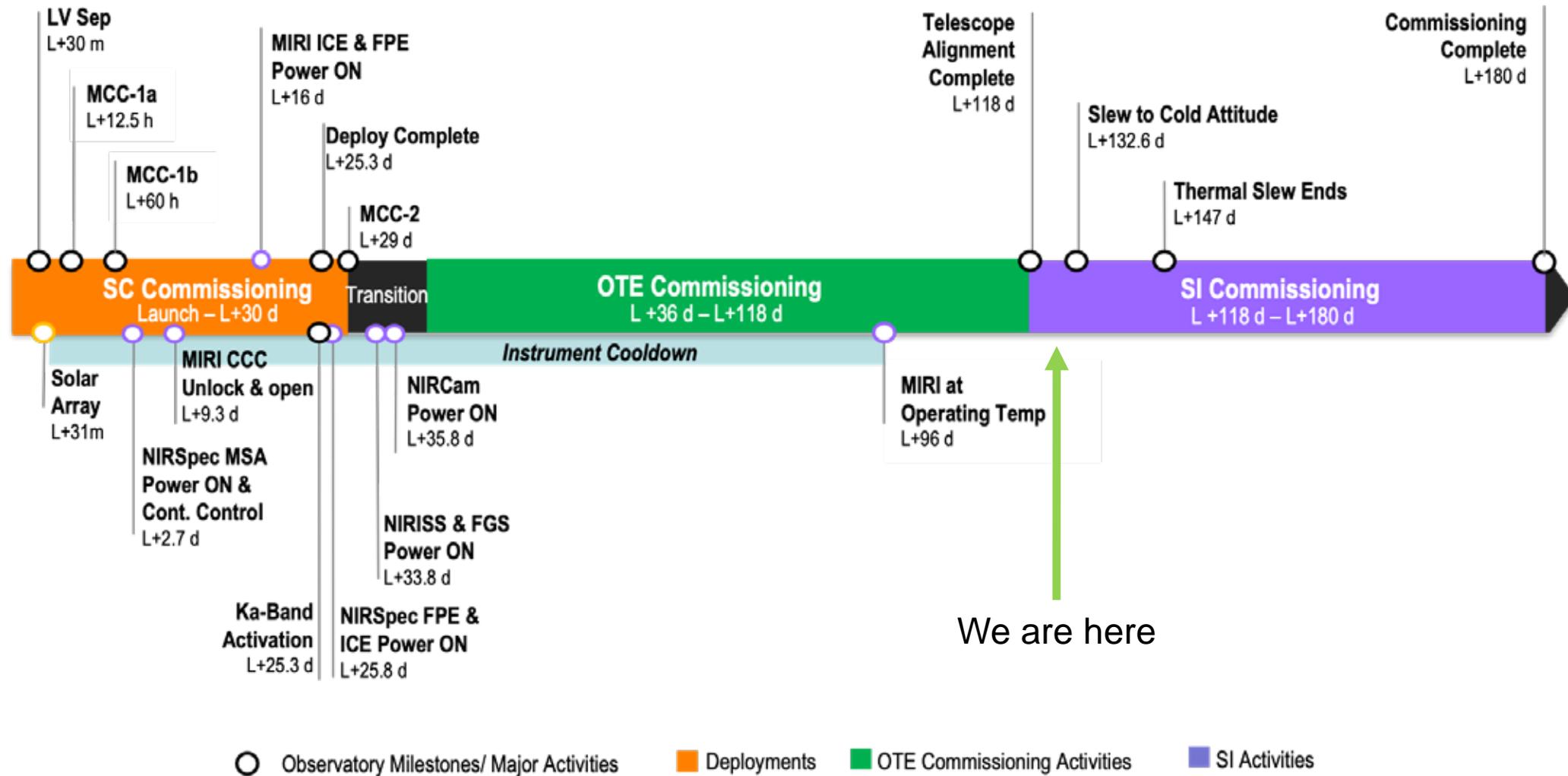




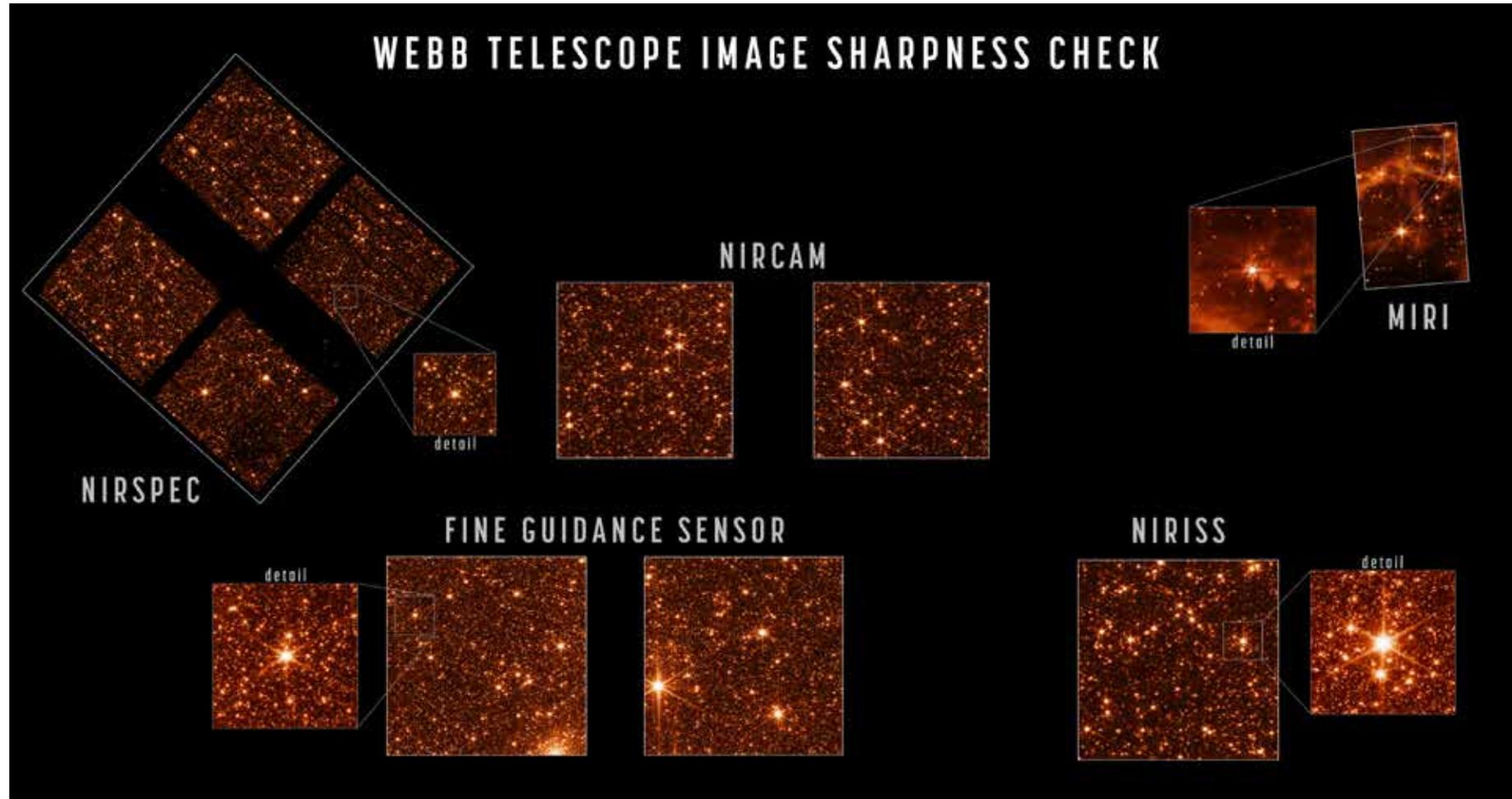
James Webb Space Telescope Commissioning Status



Commissioning Status



“It’s Full of Stars [and galaxies and gas]”



NIRCam (2 micron), NIRSpec (1.1 micron), NIRISS (1.5 micron), and MIRI (7.7 micron)

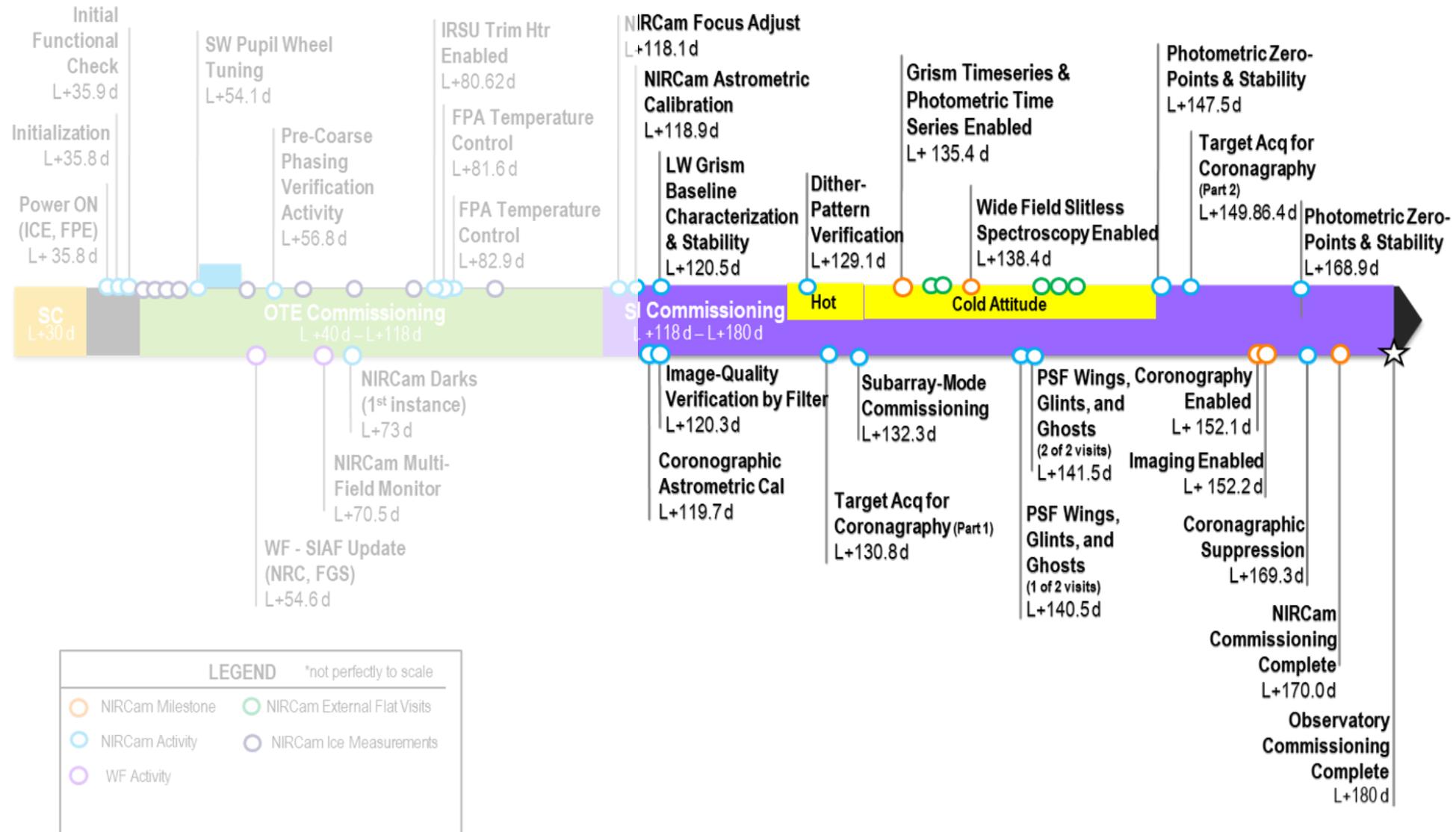
Commissioning Timeline

The CAST” lays out each step of JWST commissioning.
(CAST = Commissioning Activity Sequence Timeline)
There are 730 high-level steps in the timeline.

These are broken down into:

- ~2800 steps for deployments and spacecraft ✓
- ~5400 steps for the telescope ✓
- ~1500 steps for the science instruments

Example: NIRCcam Commissioning



JWST Cycle 1 Long Range Plan

The Cycle 1 Long Range Plans was released to the public the week of 18-April. It is a dynamic plan that will change with execution times as run, spacecraft anomalies ToO's, etc.

LRP Cycle 1 Dates: 27-June-2023 to 2-July-2023

Category	Total Time [hrs]	Total Planned Time [hrs] (%)
GO	6090.1 ¹	5749.7 (94%)
GTO	3774.0 ²	3667 (98%)
ERS ³	529.5	529.5 (100%)
Cal	659.6	659.6 (100%)
Total	11023.2	10491.0 (95%)

¹Includes 200.5 hrs of ToO's which do not get planned until activation

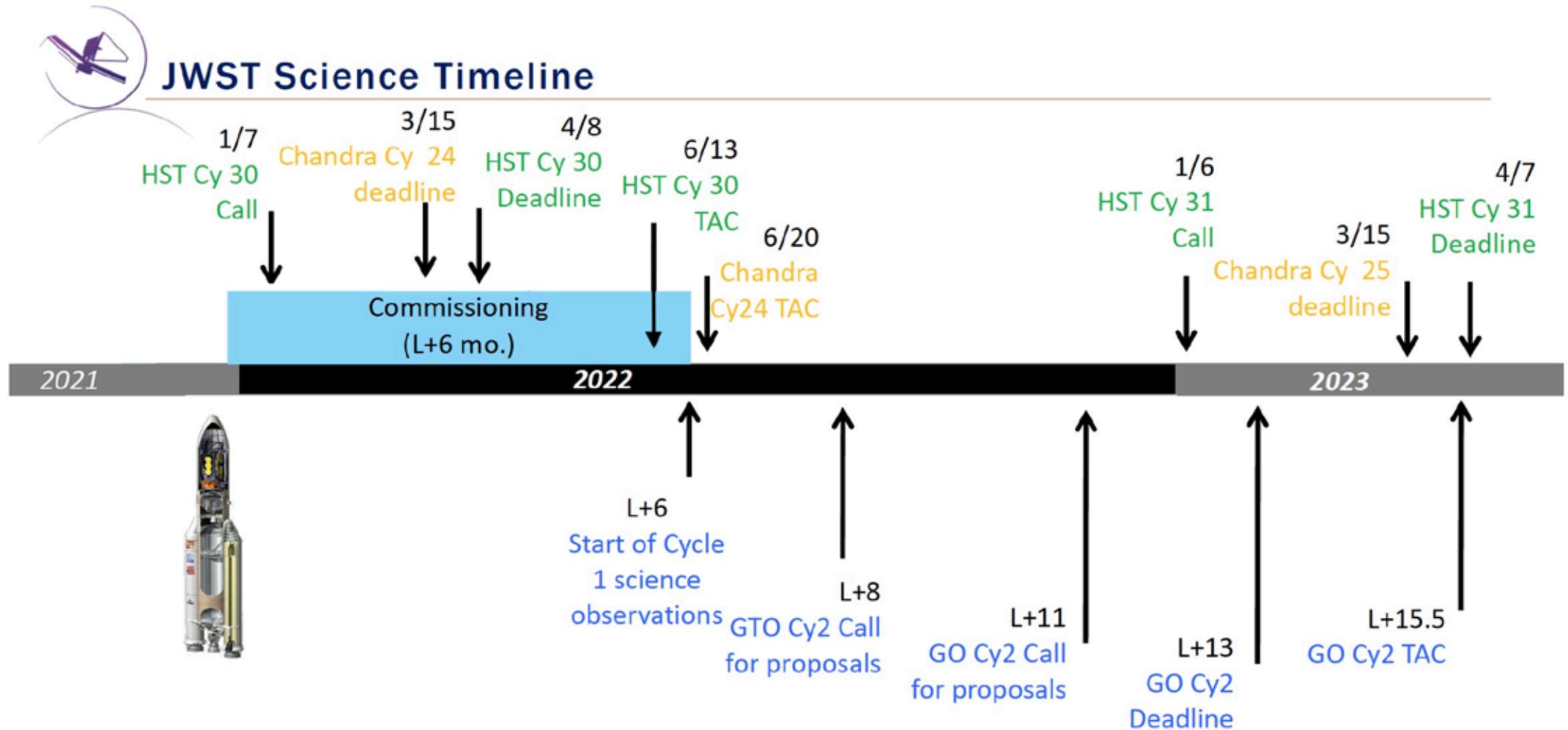
²Includes 5.2 hrs of ToO's which do not get planned until activation

³Bulk of ERS programs are schedule in the first 5 months of Cycle 1

<https://www.stsci.edu/contents/news/jwst/2022/schedule-for-cycle-1-science-operations-released>

Data courtesy N. Reid, STScI

Science Timeline



HST & Chandra dates are estimates

Webb Community Events



622 host sites registered

Events run from ERO release to October

Locally run, but NASA provides expert speakers and materials upon request



FY23 President's Budget Request



Recent Accomplishments



James Webb Space Telescope launched and successfully deployed

- On December 25, 2021, the James Webb Space Telescope was launched from Kourou Space Center to its orbit around the Sun at Sun-Earth L2
- Commissioning is underway, all systems are functioning as expected, and science observations will begin in Summer 2022

Roman Space Telescope continued progress toward a 2027 launch

- In May 2021, the Nancy Grace Roman project was replanned to accommodate the impacts of COVID-19 on the workforce and supply chain
- In September 2021, the Nancy Grace Roman Space Telescope passed its critical design review (CDR) meeting all technical and programmatic commitments, and began fabrication, integration, and test

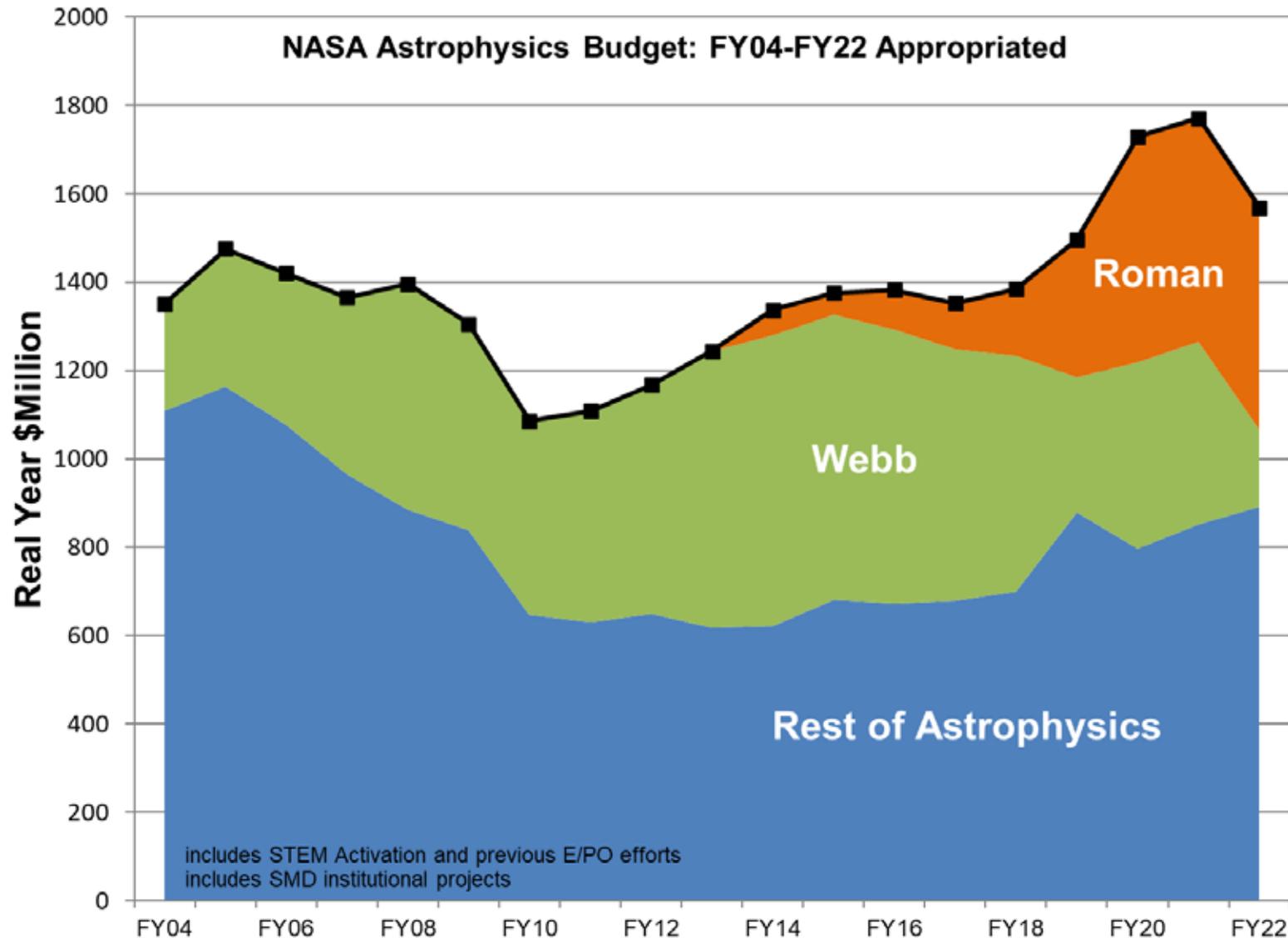
Astrophysics Explorers Program continued progress

- In December 2021, the Imaging X-ray Polarimetry Explorer (IXPE), NASA's newest Astrophysics Small Explorer mission, launched into low Earth orbit
- SPHEREx, the next Astrophysics Medium Explorer mission, passed its critical design review (CDR) in December 2021
- In October 2021, NASA selected the Compton Spectrometer and Imager (COSI) as its next Astrophysics Small Explorer mission.

The 2020 Decadal Survey was received from the National Academies

- The Decadal Survey recommends an ambitious and inspiring program of science and missions for the 2020s

FY22 Appropriation



- Astrophysics total (including Webb) at \$1.57B, down \$7M from the request.
- Webb and Roman appropriated at the request, \$175M and \$502M respectively.
- SOFIA appropriated at \$85M (request was zero).
- Science Activation appropriated \$51M, down \$5M from the request.
- Explanatory statement says,
 - “The agreement notes all recommendations of Astro2020.”
 - “NASA is expected to include appropriate funding for technology maturation in its fiscal year 2023 budget request to ensure continued Astrophysics mission success.”



FY23 SMD Budget Priorities

Promote US leadership in Earth system science and addressing the climate crisis

Lead Artemis Science

Champion Inclusion, Diversity, Equity and Accessibility

Build a balanced and innovative program driven by the highest national priorities

Advance open science for all by leveraging cutting edge data science techniques

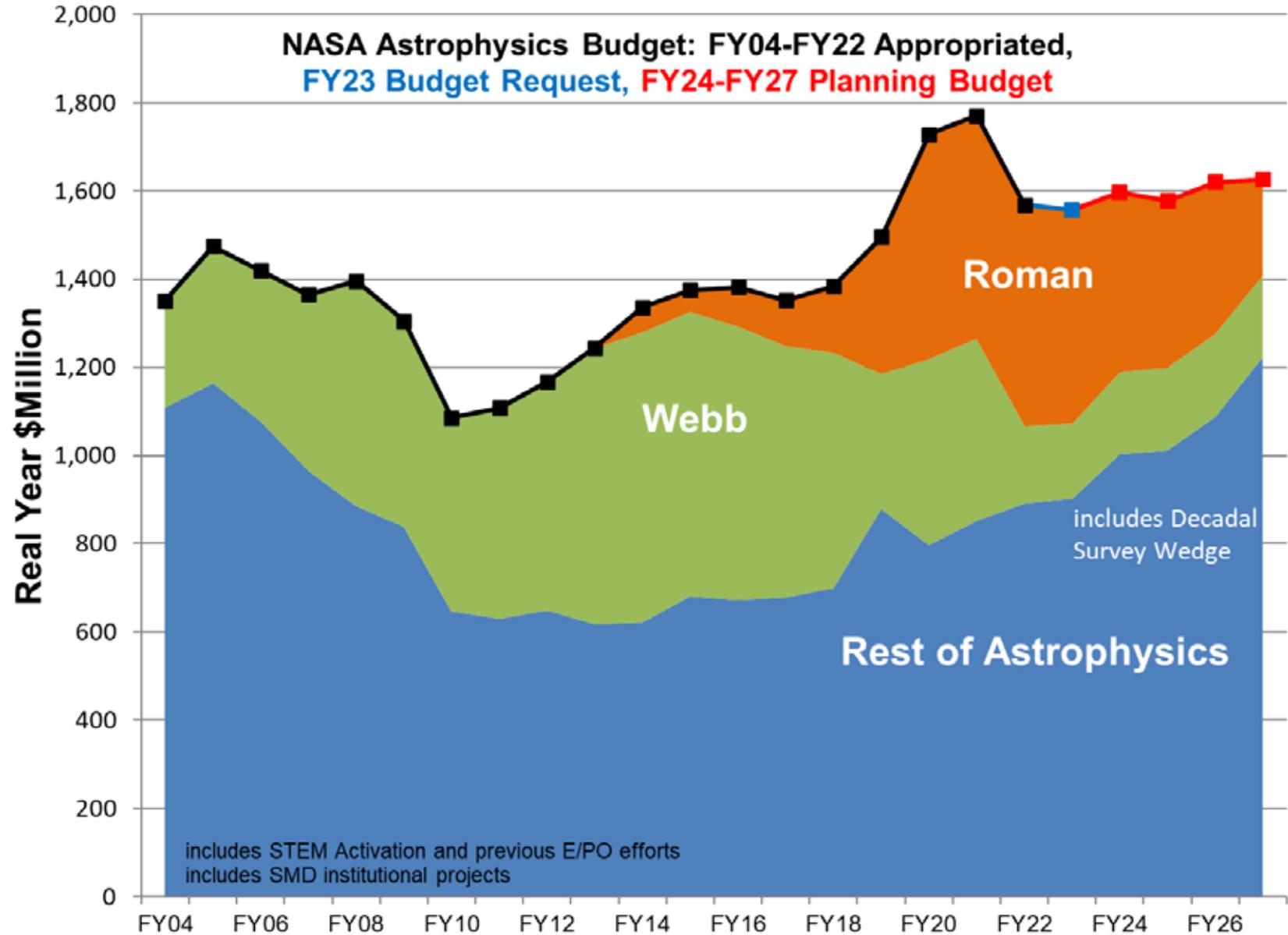


FY23 BUDGET HIGHLIGHTS

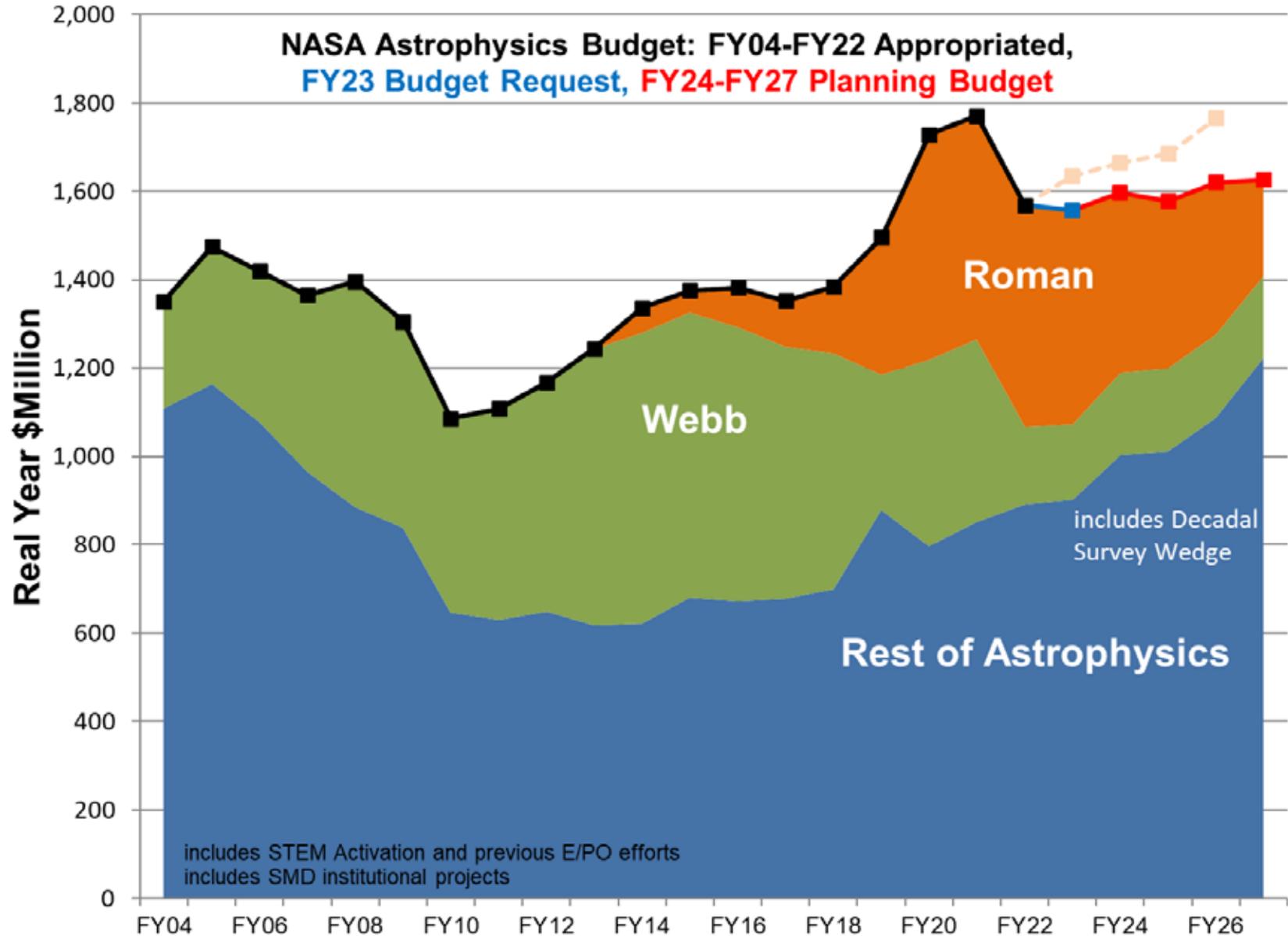
Champion Inclusion, Diversity, Equity and Accessibility (IDEA)

- Implement strategy in alignment with broader agency plan
- Increase requirement of inclusion plans in solicitations
- Continue SMD Bridge Program to increase collaborations between Minority-Serving Institutions, research intensive universities, and NASA Centers
- Develop a co-created HBCU engagement model that is sustainable and organic
- Expand dual-anonymous peer review as the default review method for all ROSES programs
- Engage underrepresented communities via listening workshops, solicitations, data workshops, mentoring and training
- Improve internal processes and missions to ensure accessibility in internal/external projects and programs including adding enforceable Codes of Conduct to science teams

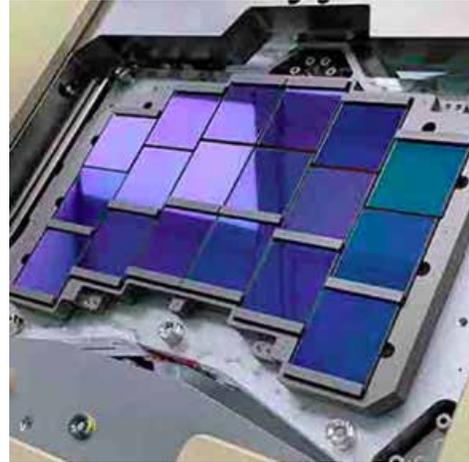
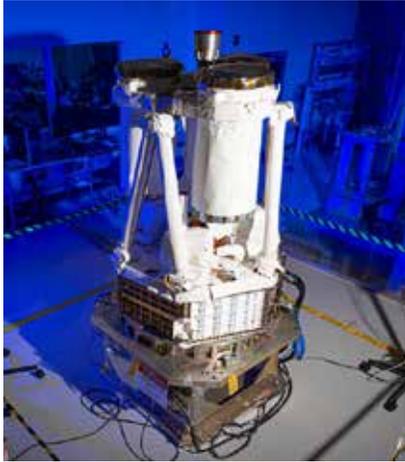
FY23 President's Budget Request



FY23 President's Budget Request



Astrophysics Budget Features



What's Changed since FY22 budget was submitted in 2021

- Additional Webb General Observer funding
- Roman budget adjustments and 7-month delay, consistent with replan due to COVID impacts
- Additional Pioneer selections & increased Pioneers cadence
- Support Great Observatory Precursor Science and Time Domain Astrophysics infrastructure systems for Decadal Survey
- Includes bridge partnerships focused on minority serving institutions and Decadal Survey recommendations for increased inclusion
- SOFIA close out in FY23 per Decadal Survey recommendation
- Extended Phase B for COSI, delayed development for next MIDEX
- Compared to the FY 2022 Budget request, delays a future Astrophysics Probe mission; AO release delayed from January 2023

What's the Same as the runout of the FY22 budget request

- Heathy R&A program
- Development of Astrophysics Explorers GUSTO and SPHEREx
- Development of contributions for JAXA-, ISA-, and ESA-led missions XRISM, ULTRASAT, Euclid, Ariel, Athena, and LISA
- Operating Missions, including Hubble, Chandra, Fermi, TESS, Gehrels Swift, NuSTAR, NICER, per Senior Review

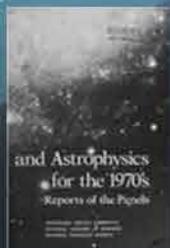


NASA's Preliminary Response to the 2020 Decadal Survey

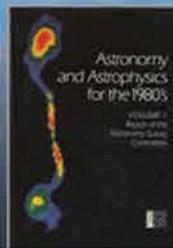


Astrophysics

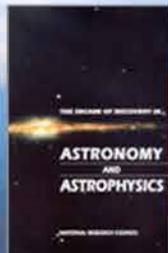
Decadal Survey Missions



1972
Decadal
Survey
Hubble



1982
Decadal
Survey
Chandra



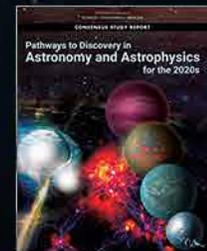
1991
Decadal
Survey
Spitzer



2001
Decadal
Survey
Webb



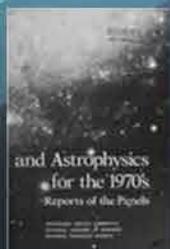
2010
Decadal
Survey
Roman



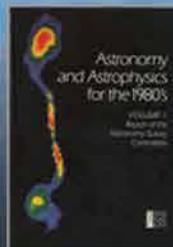
2021
Decadal
Survey

Astrophysics

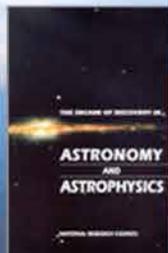
Decadal Survey Missions



1972
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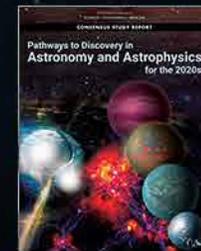
1991
Decadal
Survey
Spitzer



2001
Decadal
Survey
Webb



2010
Decadal
Survey
Roman



2021
Decadal
Survey

- We are bound by the budgets that we have
- First budget that is fully informed by the Decadal Survey will be the FY24 budget proposal, which will be formulated by NASA Astrophysics in Spring 2022 and submitted to Congress in February 2023

Preliminary Response to Astro2020

Large-Scale Opportunities: Future Great Observatories

Recommendation

Recommendation on page 7-11: The **NASA Astrophysics Division should establish a Great Observatories Mission and Technology Maturation Program**, the purpose of which is to co-develop the science, mission architecture, and technologies for NASA large strategic missions identified as high priority by decadal surveys.

Recommendation on page 7-17: After a successful mission and technology maturation program, **NASA should embark on a program to realize a mission to search for biosignatures from a robust number of about ~25 habitable zone planets and to be a transformative facility for general astrophysics**. If mission and technology maturation are successful, as determined by an independent review, implementation should start in the latter part of the decade, with a target launch in the first half of the 2040s.

Preliminary response

- NASA conducted a Large Mission Study of lessons learned from the development of large space missions in the past; many of the practices that NASA has committed to in the Large Mission Study Implementation Plan match elements of the Great Observatory Mission and Technology Maturation Plan
- NASA will undertake a three-stage plan leading to a decision to begin formulation of NASA's next great observatory; the first stage has already been initiated

Recent Cost Performance

The 29 Science missions launched after establishment of the 70% JCL requirement (excluding JWST) have underrun their Phase C/D budget commitments by a net 2.3%

Total portfolio overrun is 3.7% when including JWST (assumes first baseline with JCL in 2011)

SMD continues to refine its ability to execute missions within cost commitments by implementing improved management techniques (particularly on large strategic missions) and the use of independent review boards and cost estimates

	KDP-C Dev Baseline \$M	Actual \$M	Actual vs. Baseline	
NuSTAR	109.9	116.0	6%	
Landsat 8	583.4	502.8	-14%	
IRIS	140.7	143.0	2%	
LADEE	168.2	188.2	12%	
MAVEN	567.2	472.0	-17%	
GPM	555.2	484.3	-13%	
OCO-2	249.0	320.3	29%	
SMAP	485.7	454.3	-6%	
MMS	857.3	875.3	2%	
Astro-H/Hitomi*	44.9	71.2	59%	
OSIRIS-REX	778.6	620.8	-20%	
CYGNSS	151.1	127.1	-16%	
SAGE-III*	64.6	88.2	37%	
TSIS-1*	49.8	19.8	-60%	
TESS	323.2	273.4	-15%	
InSight	541.8	635.8	17%	
GRACE-FO	264.0	238.1	-10%	
Parker	1055.7	955.7	-9%	
ICESat 2	558.8	713.2	28%	
ECOSTRESS*	42.5	36.3	-15%	
GEDI*	91.2	85.5	-6%	
OCO-3*	62.5	62.2	-1%	
ICON	196.0	205.4	5%	
SOC	376.6	275.8	-27%	
Mars 2020	1676.9	1994.5	19%	
Landsat 9	634.2	465.7	-27%	*est.
Lucy	622.0	565.0	-9%	*est.
IXPE*	163.0	156	-5%	
DART	258.3	262.4	2%	
<u>JWST</u>	<u>6197.9</u>	<u>7117.1</u>	<u>15%</u>	*est.
Total with JWST	17,870.0	18,525.2	3.7%	total overrun
Total w/o JWST	11,562.2	11,292.1	-2.3%	total underrun

* No JCL conducted at confirmation

Large Mission Study



<https://science.nasa.gov/about-us/large-mission-study>

October 2019 – October 2020

SMD Large Missions Study Implementation Plan

No.	Large Missions Study Recommendation	Disposition	Large Missions Study Implementation Plan
1	<i>Pre-Phase A Team Composition</i>	Accept	Staffing will be based on needed skill sets and expertise (not based on availability of personnel). An Agency-wide search shall be conducted, followed by a nationwide search, if needed
2	<i>Pre-Phase A Architecture Trades and Descope Options</i>	Accept	Program Office will conduct independent assessment of Pre-Phase A architecture trades and descope options for evaluation at KDP-A. Implementation effective immediately.
3	<i>System Maturity Assessment</i>	Accept w/Follow-Up	Further action is required. A team, sponsored by the SMD DAA/P and led by the SMD Chief Engineer, will be formed for further investigation.
4	<i>Technology Integration into Complex Systems</i>	Partially Accept	Mandate increased scrutiny of technology maturity at reviews and KDPs. Implementation effective immediately. Further action is required - A strategic approach will be developed by the SMD Chief Technologist to identify technology needs and funding sources for technology development.
5	<i>Analytical Tools</i>	Partially Accept	Large strategic missions will incorporate common tool sets, when possible, and establish an agreed margin and risk philosophy with partners and providers early in the life cycle.
6	<i>Cost and Schedule Estimation</i>	Accept	Life cycle cost estimates shall be communicated in terms of bins for Pre-Phase A and ranges for Phases A and B to set external expectations. Implementation effective immediately.
7	<i>Standing Review Boards (SRBs)</i>	Accept	The SMD policy of convening the SRBs prior to MCR, and when required, convening of the Independent Review Boards (IRBs), has already been implemented. Initiating SRB kickoff meetings.
8	<i>Instrument Selection Process</i>	Partially Accept w/Follow-Up	Further action is required. A team led by the SMD Deputy AA for Research will be established. Modification of SMD policy may be required.
9	<i>SMD Capabilities</i>	Accept	Program Offices of large missions will be adequately staffed early in pre-formulation in order to perform programmatic assessments and oversight. Implementation effective immediately.
10	<i>Center Capabilities</i>	Accept	SMD and Centers have ownership and accountability of large strategic missions and will work closely to identify and solve problems. Implementation effective immediately.

The SMD Large Missions Implementation Plan will require an intentional shift in how we approach the development of our missions

Large Mission Study



<https://science.nasa.gov/about-us/large-mission-study>

October 2019 – October 2020

SMD Large Missions Study Implementation Plan

No.	Large Missions Study Recommendation	Disposition	Large Missions Study Implementation Plan
1	<i>Pre-Phase A Team Composition</i>	Accept	Staffing will be based on needed skill sets and expertise (not based on availability of personnel). An Agency-wide search shall be conducted, followed by a nationwide search, if needed
2	<i>Pre-Phase A Architecture Trades and Descope Options</i>	Accept	Program Office will conduct independent assessment of Pre-Phase A architecture trades and descope options for evaluation at KDP-A. Implementation effective immediately.
3	<i>System Maturity Assessment</i>	Accept w/Follow-Up	Further action is required. A team, sponsored by the SMD DAA/P and led by the SMD Chief Engineer, will be formed for further investigation.
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The SMD Large Missions Implementation Plan will require an intentional shift in how we approach the development of our missions



Astro2020 recommendations for the Great Observatories Mission and Technology Maturation Program (aka GOMAP)

Future Great Observatories

Large observatories are a critical component of NASA's astrophysics portfolio

- The Decadal Survey recommends a compelling, feasible, timely portfolio of future great observatories that is part of a balanced Astrophysics program

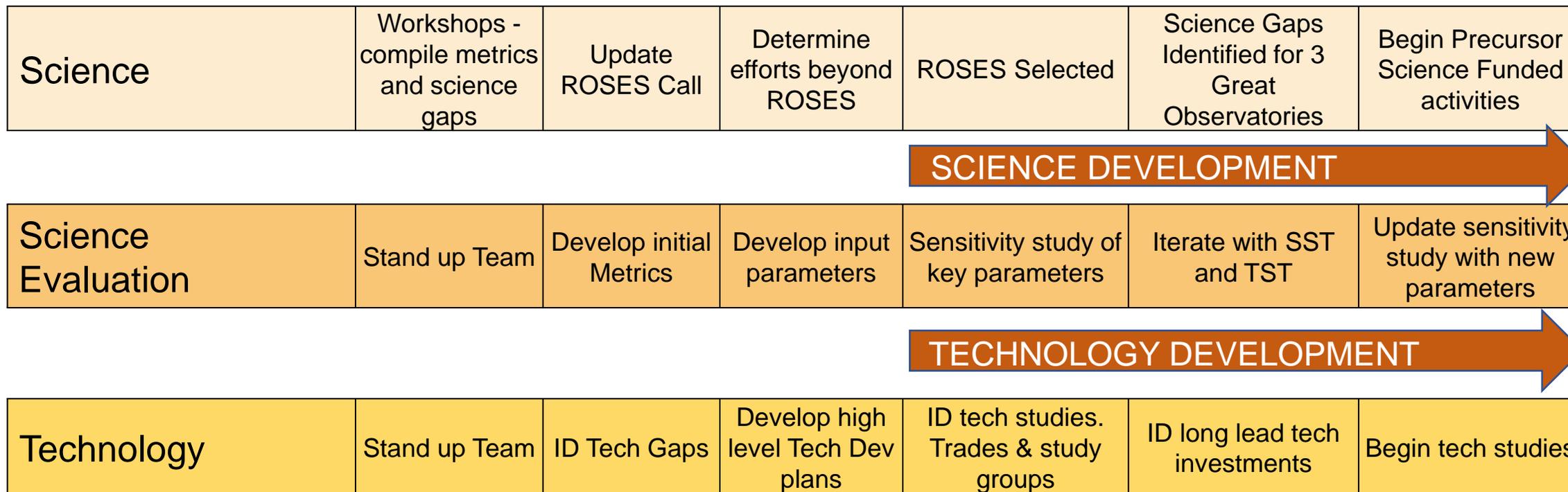
Today NASA's priority is ensuring mission success for Webb and Roman

- Webb has been launched and has begun its 6-month commissioning phase
- Roman successfully passed its Critical Design Review (CDR) and has been replanned to account for COVID impacts; the new launch commitment date is mid-2027 (7 month delay due to COVID)

Now is not the time to start a Future Great Observatory; now is the time to prepare NASA will take a deliberate, multi-stage planning and strategy approach to the next large observatory mission

- Stage 1 – Focus on enabling science and technology; begin Stage 1 now
- Stage 2 – Begin the Decadal Survey recommended “Great Observatories Maturation Program”; conduct Analysis of Alternatives (AoA) and science / technology / architecture trades; begin Stage 2 in a few years (driven by planning and budget availability)
- Stage 3 – Pre-formulation and decision to start the next Great Observatory; begin after Stage 2 AoA complete (Decadal Survey estimates 6 years for Stages 2 and 3)

STAGE 1 ACTIVITIES



Note: This is not a timeline; some activities within each lane occur in parallel
 There is cross-communication and cross-participation between activities in different rows
 ROSES call for precursor science investigations anticipated for January 2023

Next Steps for Stage 1

Science

Precursor Science Workshop I

Apr 20-22

Joint PAG EC meeting

Apr 27

Precursor Science Workshop II

July TBD

Science Gaps identified for 3 FGO's

Oct 1

Precursor Science added to ROSES

Nov 1

Community Participation via

- PAGs, e.g. SIGs and SAGs
- Workshops
- Propose for R&A and SAT funding through ROSES

Science Evaluation

- ExoSET at Precursor Science Workshop I (**Apr 20-22**) as example of science evaluation, building on prior efforts
- Document ExoSET science metrics from PAGs **Sept 30**
- IROUV-Astro, X-Ray, Far-IR SETs being formulated
- Anticipate SETs community workshop(s) next year

Technology

- Update Gap lists: present at **June** AAS PAG meetings
- SAT proposals due **Dec 15**
- Plan RFP release to industry **early CY 2023**, for start in late CY 2023
- Community technology workshop(s) in **CY 2023**

Preliminary Response to Astro2020

State of the Profession: Diversity, Inclusion, Workforce

Recommendation	Preliminary response
IDEA Incentives pg. 3-14	<ul style="list-style-type: none">• Under study by the Astrophysics Division IDEA task force
IDEA Workforce pg. 3-22	<ul style="list-style-type: none">• NASA has received funding to start a Bridge Program within the Science Mission Directorate in FY22, with \$5M for FY22 and increasing amounts planned for in future years• Partnerships with NASA's Office of STEM Engagement to increase support of HBCUs, TCUs, and other MSIs
Traineeship Funding pg. 3-23	<ul style="list-style-type: none">• Under study by the Astrophysics Division IDEA task force• Astrophysics mission design summer school, to help train new PIs, in 2023
Postdoc Fellowships pg. 3-23	<ul style="list-style-type: none">• NASA conducted an independent review of the NASA Hubble Fellowship Program in 2021 to assist NASA in increasing the effectiveness of the program and bolstering its excellence, with a focus on diversity, equity, and inclusion of the program. NASA is working on an implementation plan that is responsive to its 32 recommendations
Address Harassment & Discrimination pg. 3-27	<ul style="list-style-type: none">• A working group has been established including the Science Mission Directorate, Office of Chief Scientist, and Office of General Counsel• Research Misconduct is defined Government-wide at 14 CFR 1275.100; individual agencies do not have the authority to redefine research misconduct to include sexual harassment and discrimination
IDEA Evaluation Criterion pg. 3-30	<ul style="list-style-type: none">• NASA's ROSES Inclusion Plan initiative started in 2021• Including diversity and inclusion of teams in evaluation of AO proposals starting in 2022

Importance of Inclusion, Diversity, Equity, Accessibility (IDEA)



“The panel [on the State of the Profession and Societal Impacts] asserts that fundamentally, the pursuit of science, and scientific excellence, is inseparable from the humans who animate it.”

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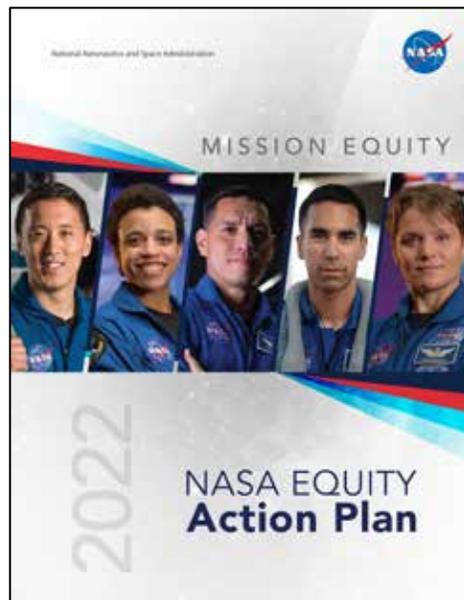
NASA is committed to integrating inclusion, diversity, equity, and accessibility (IDEA) into all activities (missions, programs, reviews, internal matters, etc.)

All NASA’s astrophysics programs and projects incorporate IDEA initiatives. All Decadal Survey initiatives incorporate IDEA initiatives.

Importance of Inclusion, Diversity, Equity, Accessibility (IDEA)



NASA has released its Equity Action Plan (<https://www.nasa.gov/mission-equity>)

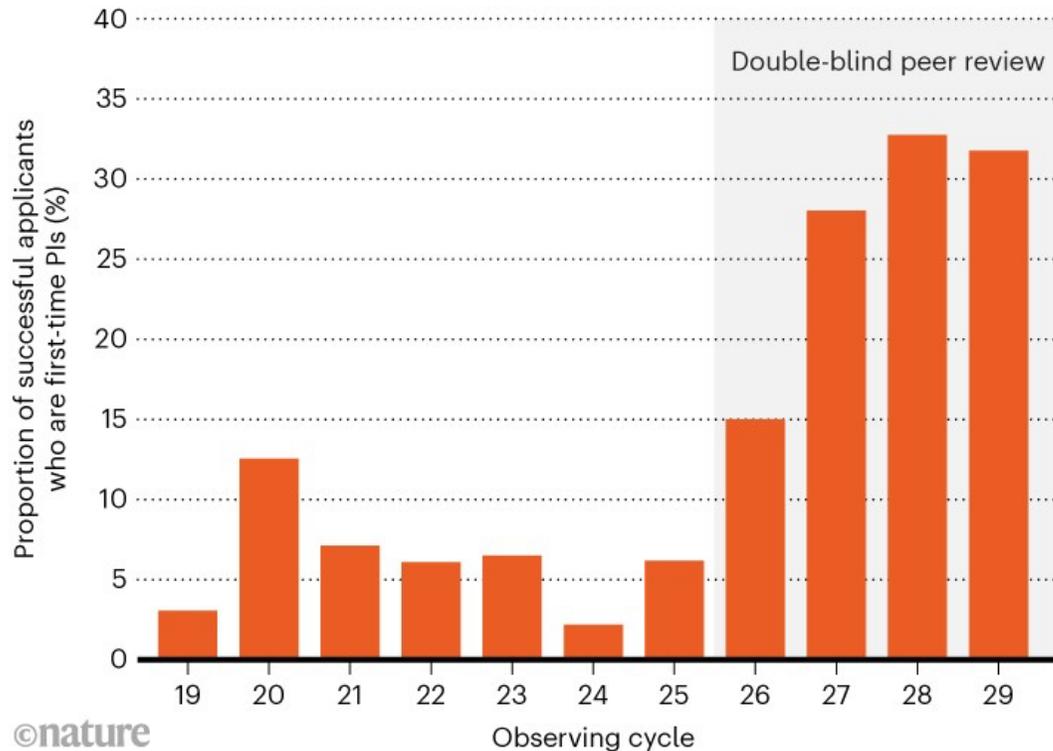


- NASA launched its Equity Action Plan in April 2022, a comprehensive effort to assess and examine the potential barriers and challenges that exist for communities that are historically underrepresented and underserved in the aerospace and STEM fields.
- NASA is assessing its programs, procurement processes, and grant policies to identify systemic barriers that limit representation and participation of a diverse community of students and professionals.
- As a leader in aerospace, NASA has a responsibility to model inclusivity by implementing initiatives and programs that create opportunities for those who want to contribute to our work in space.

SMD Inclusion, Diversity, Equity, Accessibility (IDEA) Initiatives

FIRST-TIME OBSERVERS

Since the introduction of double-blind peer review for proposals in 2018 (cycle 26), higher numbers of new principal investigators have won observing time on the Hubble Space Telescope.



“double-blind peer review” is another name for “dual anonymous peer review”

- University – Center – Minority Serving Institutions (MSI) bridge programs and learning workshops
- Implementing IDEA requirements in ROSES and Announcements of Opportunity
- Enhanced student programs to improve access to underserved populations (Student Airborne Research Program, Rock On, data science internships)
- NASA SMD commissioned National Academies study to examine [“Increasing Diversity and Inclusion in the Leadership of Competed Space Missions”](#)

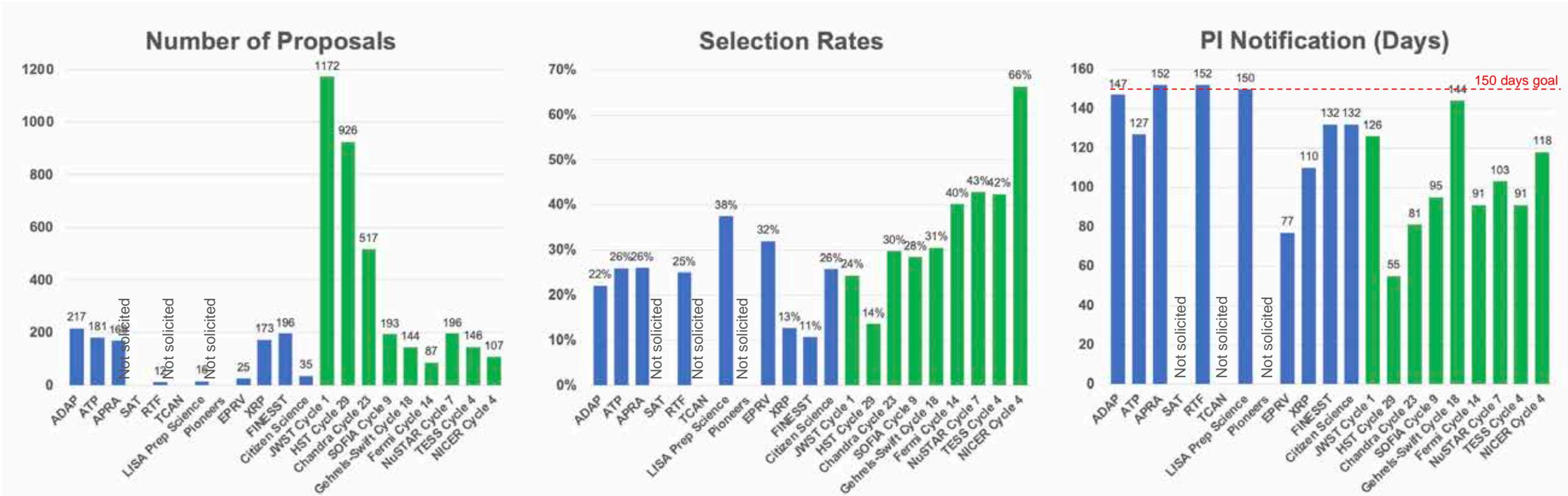
Preliminary Response to Astro2020

Science Foundations

Recommendation	Preliminary response
Proposal Success Rates pg. 4-3	<ul style="list-style-type: none">• NASA will continue to release data on proposal success rates, both aggregated and by program element, at every AAS Town Hall and at meetings of the Astrophysics Advisory Committee
Proposal Demographics pg. 3-29	<ul style="list-style-type: none">• NASA is collecting self-reported demographic data through NSPIRES on proposers, co-investigators, awardees, and reviewers• NASA has charged the National Academies with conducting a study that will enumerate the types of data that NASA should be collecting• NASA, NSF, and DOE have engaged with the AAAC to assess the Agencies' current practices in collecting, evaluating, and publicly reporting demographic data
IDEA Evaluation Criterion pg. 3-30	<ul style="list-style-type: none">• NASA's ROSES Inclusion Plan initiative started in 2021• Including diversity and inclusion of teams in evaluation of AO proposals starting in 2022

Astrophysics R&A Selection Rates

March 2021-2022



R&A: 1,024 proposals
 GO/GI: 3,498 proposals
 Total: 4,532 proposals

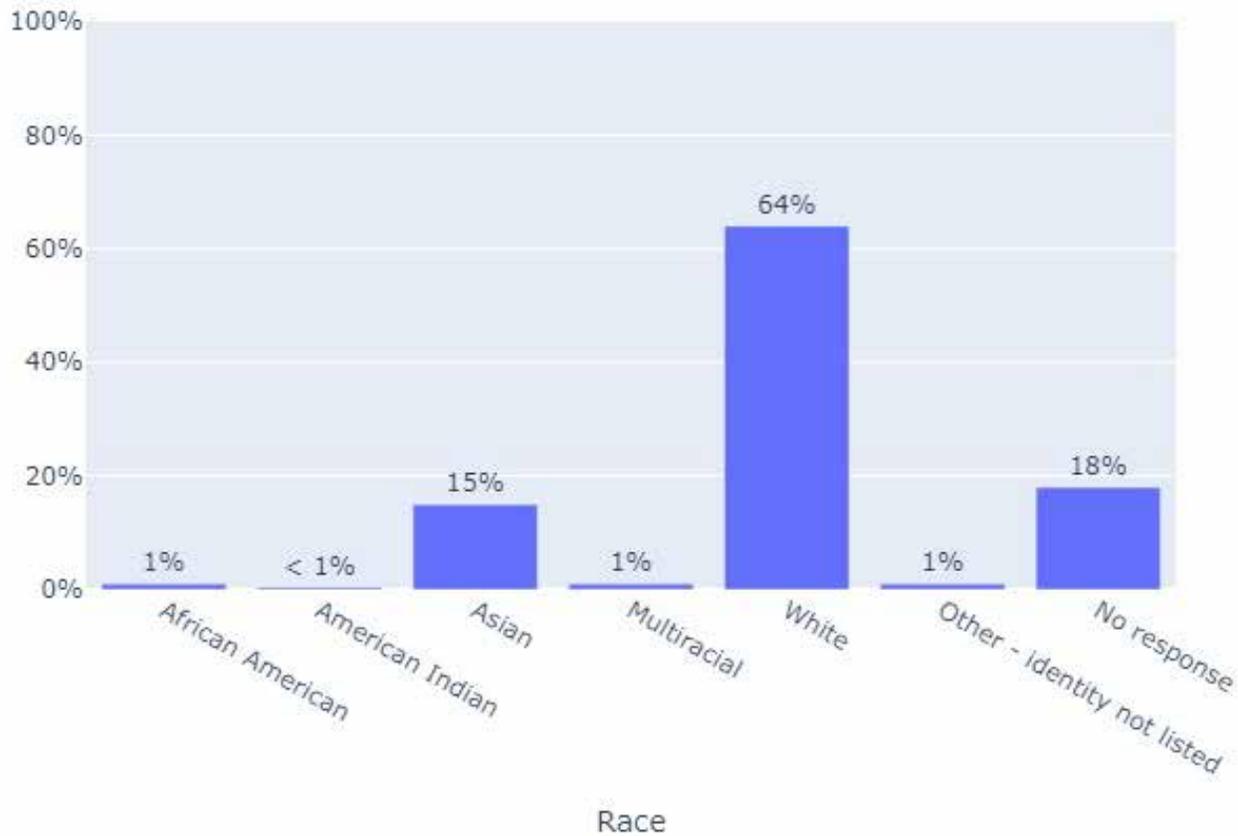
R&A: 20%
 GO/GI: 27%
 Average: 25%

80% of PI notification:
 R&A: 147 days
 GO/GI: 119 days

Sample of demographics: PI-identified race, aggregated over SMD 2014-2019

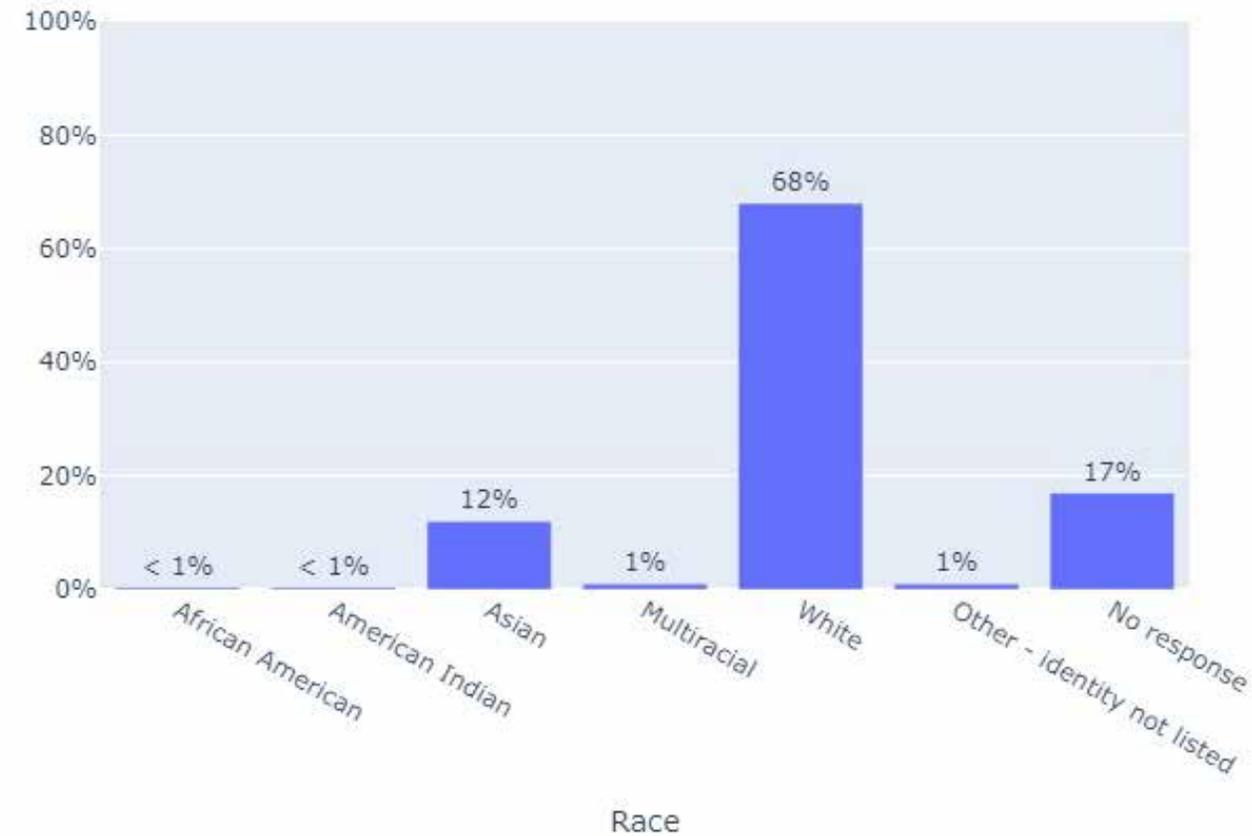
Race of Submitted SMD PIs

N = 24778 | Missing data = 216 | 2014 - 2019



Race of Selected SMD PIs

N = 6099 | Missing data = 17 | 2014 - 2019



ROSES Inclusion Plans Initiative

“NASA ... should consider including diversity ... in the evaluation of funding awards” (Astro2020, p. 3-30)

Inclusion plans are required with selected ROSES elements.

Year 1 – ROSES-21

- Only Astrophysics Theory Program & PRISM (inclusion plan pilot)
- Inclusion plans evaluated for adequacy and completeness; feedback provided to the proposers; feedback not folded into the adjectival ratings or selection recommendations
- White paper published (<https://science.nasa.gov/astrophysics/documents>)

Year 2 – ROSES-22

- Seven astrophysics ROSES elements + at least one in each division
- Inclusion plans evaluated for adequacy and completeness; feedback provided to the proposers; feedback not folded into the adjectival ratings or selection recommendations; selected proposals will not be funded until unacceptable inclusion plans are remedied

Year 3 – ROSES-23

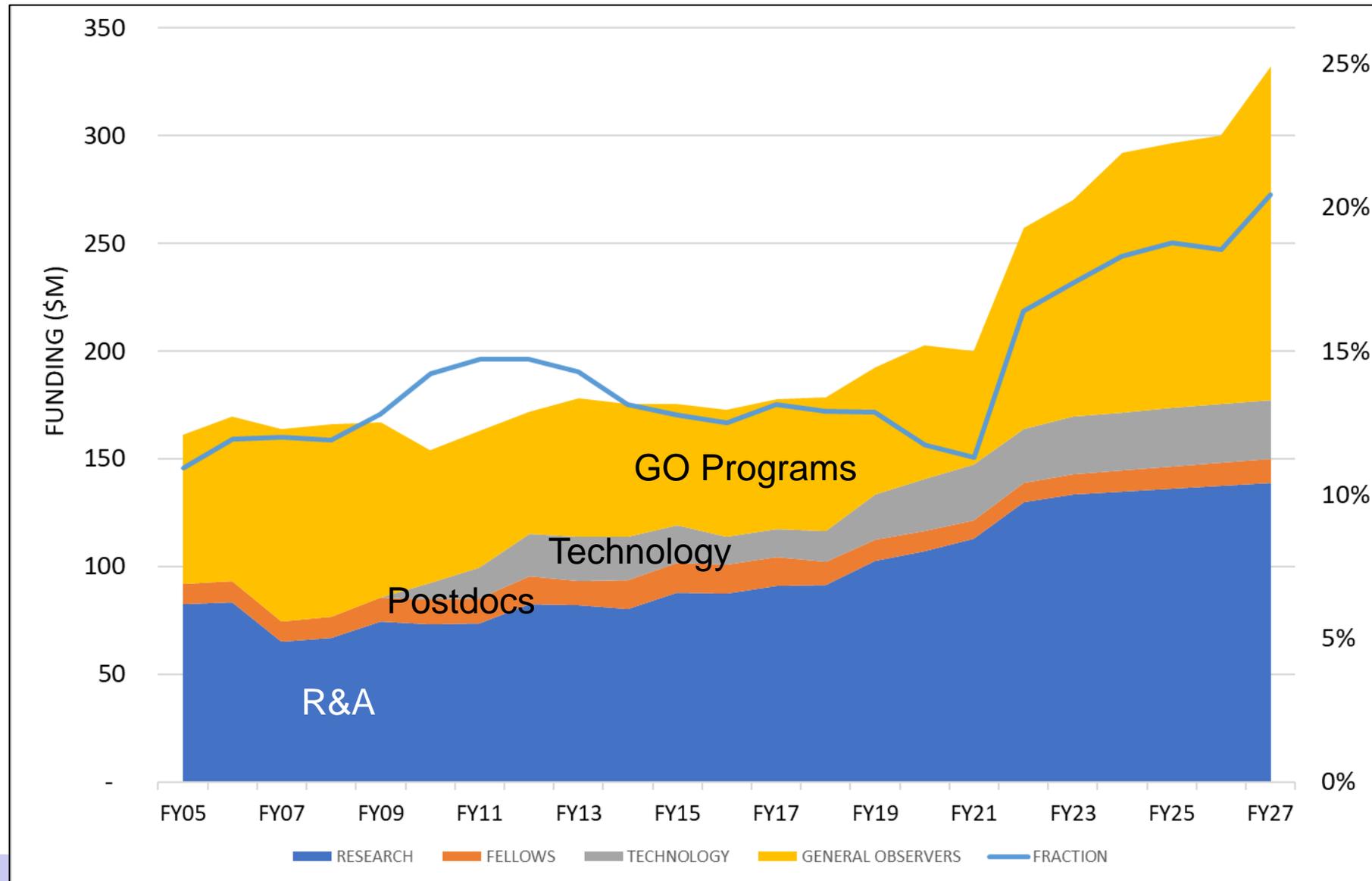
- Inclusion plans evaluated for adequacy and completeness; feedback provided to the proposers; feedback not folded into the adjectival ratings; proposals with unacceptable inclusion plans will not be selected

Preliminary Response to Astro2020

Science and Technology Foundations

Recommendation	Preliminary response
Theory Funding pg. 4-10	<ul style="list-style-type: none">• Astrophysics Theory Program (ATP) has a 22% selection rate with biannual calls• Increasing the budget by 30% would result in a 28% selection rate for biannual calls, but only a 14% selection rate for annual calls• Keeping in mind that the Decadal Survey states that a 22% success rate “remains low,” NASA will consider options for restoring an annual cadence for ATP
Archive Coordination pg. 4-20	<ul style="list-style-type: none">• NASA and NSF have established a cross-agency working group to improve coordination among U.S. archive centers
Lab Astrophysics Review pg. 4-28	<ul style="list-style-type: none">• NASA and NSF have discussed with the AAAC plans to establish a task force of the AAAC to report on prioritized needs for laboratory astrophysics as well as appropriate funding mechanisms for addressing those priorities
APRA Technology Funding pg. 6-4	<ul style="list-style-type: none">• NASA will consider increases as part of its FY24 budget formulation process
SAT Criteria pg. 6-5	<ul style="list-style-type: none">• NASA amended ROSES 2021 on July 8, 2021, to expand the scope of the Strategic Astrophysics Technology (SAT) program element to include technology maturation targeted in strategic areas identified for the competed Probe class missions
Balloon Review pg. 6-8	<ul style="list-style-type: none">• NASA discussed the formation of a Balloon Program Review task force with the APAC at its Spring 2022 meeting

R&A Funding / Fraction of Budget



Preliminary Response to Astro2020

Balancing the Operating Portfolio

Recommendation	Preliminary response
SOFIA pg. 5-12	<ul style="list-style-type: none">• NASA has removed SOFIA from the 2022 Senior Review• NASA and the German Space Agency (DLR) will conclude the SOFIA mission after a successful eight years of science. SOFIA will end operations no later than Sept. 30, 2022, at the conclusion of its current mission extension.

NASA and its partners at the German Space Agency at the Deutsches Zentrum für Luft- und Raumfahrt (DLR) will conclude the Stratospheric Observatory for Infrared Astronomy (SOFIA) mission, after a successful eight years of science.

SOFIA will end operations no later than Sept. 30, 2022, at the conclusion of its current mission extension.

Preliminary Response to Astro2020

Sustaining Programs & Medium-Scale Opportunities

Recommendation	Preliminary response
Explorer Cadence pg. 6-9	<ul style="list-style-type: none">• NASA has maintained a cadence of Astrophysics Explorer AOs every 30 months (4 per decade) since 2011
Astrophysics Probes pg. 7-20	<ul style="list-style-type: none">• NASA issued a community announcement on January 11, 2022, with details regarding a planned AO for an Astrophysics Probe mission that is responsive to the Decadal Survey report• NASA FY23 Budget request stated that the Astrophysics Probe A would be “no earlier than January 2023”• NASA expects to announce an update very shortly on the timing of the Astrophysics Probe AO
Roman Science Program Review pg. 7-35	<ul style="list-style-type: none">• NASA asked the CAA to conduct a non-advocate review of the Roman Space Telescope’s science program; the CAA working group held its first meeting in February 2022
Time Domain Program pg. 7-19	<ul style="list-style-type: none">• NASA is committed to realizing the science of the recommended Time Domain Astronomy and Multi Messenger Astrophysics (TDAMM) program• A TDAMM workshop is planned for August 2022

NASA Time Domain & Multi Messenger (TDAMM) Mission Portfolio

Operating Missions

Hubble
Chandra
Gehrels Swift
Fermi
CALET (w/ JAXA)
AMS (DOE mission)
NICER
TESS

Missions in Development

BurstCube (cubesat)
BlackCat (cubesat)
PUEO (balloon payload)
StarBurst (Pioneer)
ULTRASAT (w/ ISA)
COSI (SMEX)
Roman

Future Missions under study or being proposed

THESEUS (w/ ESA)
Proposed CubeSat
Proposed Pioneer
Proposed Mission of Opportunity
Proposed MIDEX
Future Probe



Time Domain & Multi-Messenger Program

Actions are being developed to address Time Domain Astrophysics and Multi Messenger (TDAMM) recommendations of the 2020 Decadal Survey; NASA's current thinking is

- A panchromatic, multi-messenger program enabled by current and upcoming ground- and space-based facilities will require coordination and broad community involvement
- In addition to new flight missions, the program must involve multi-mission, interagency, and international coordination in the areas of data archives, data standards, transient alerts, and community research opportunities
 - The FY 2023 budget request includes initial funding for these activities
- Existing and future (in development) NASA missions will continue to make valuable contributions to TDAMM, and upcoming NASA missions and partnerships promise to do likewise
- This will be a program with extensive international cooperation, shaped using broad community input
 - TDAMM workshop August 22 – 26, Annapolis MD. Please contact: TDAMM-Workshop@bigbang.gsfc.nasa.gov
- NASA has invited its international partners and NSF to participate in the necessary cooperation



Big Finish





ASTROPHYSICS FLEET

PRE-FORMULATION

MIDEX/MO 2028

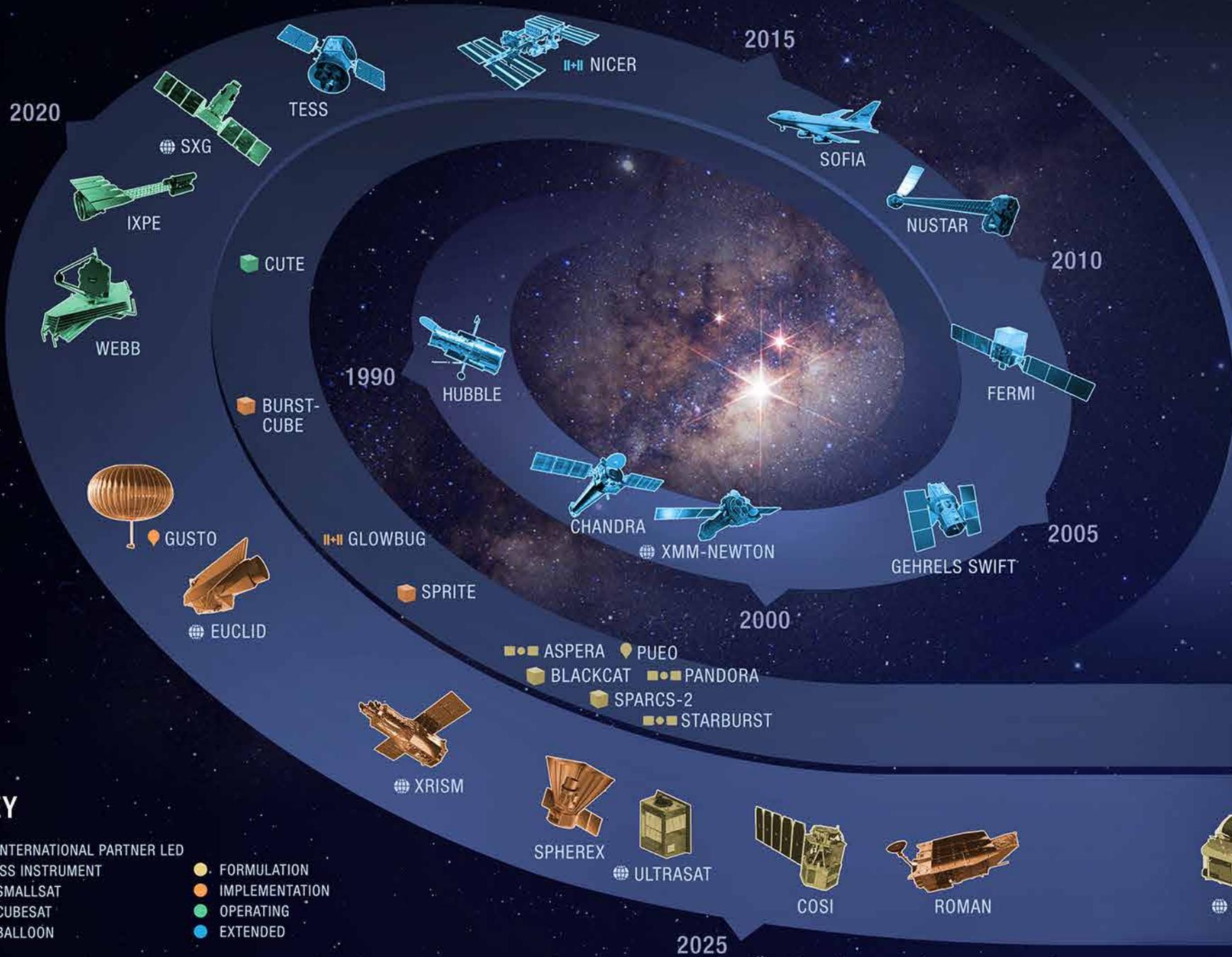
PROBE ~2030

ATHENA EARLY 2030s

LISA MID 2030s

VERY SMALL MISSIONS

TRADITIONAL MISSIONS



KEY

- INTERNATIONAL PARTNER LED
- ISS INSTRUMENT
- SMALLSAT
- CUBESAT
- BALLOON
- FORMULATION
- IMPLEMENTATION
- OPERATING
- EXTENDED



ASTROPHYSICS FLEET

PRE-FORMULATION

- MIDEX/MO 2028
- PROBE ~2030
- ATHENA EARLY 2030s
- LISA MID 2030s

YOUR
DECADAL
SURVEY
HERE

